

CLAIMS

We claim:

- 1 1. Method for evaluating a network, comprising the steps
2 of:

3 measuring average message delay through said network;

4 determining the standard deviation of said message
5 delay; and

6 calculating the discrete utilization of said network as
7 the ratio of said average message delay to said
8 standard deviation.
- 1 2. The method of claim 1, further comprising the steps of:

2 factoring instances of dropped messages as full
3 utilization in calculating said discrete utilization.

1 3. Method for evaluating a network, comprising the steps
2 of:

3 communicating of a plurality of long packets and short
4 packets through said network;

5 determining the best time of said long packets;

6 determining the best time of said short packets;

7 responsive to the length of said long and short packets
8 and their respective best times, determining network
9 Network Queue Wait Time (Tw) and the Standard Deviation
10 of Network Queue Wait Time, (σTw);

11 responsive to said Tw and σTw , calculating the discrete
12 utilization (p) of said network.

1 4. The method of claim 3, wherein said Tw, σTw and p are
2 related by the expression:

3
4
$$Tw / \sigma Tw = p / \sqrt{(p * (2 - p))} .$$

1 5. Method for evaluating a network, comprising the steps
2 of:

3 sending test packets across said network;

4 responsive to said test packets, deducing the capacity
5 of said network, its latency, and the current
6 utilization of said capacity.

1 6. The method of claim 5, further comprising the steps of:

2 calculating network hop count as a measure of the
3 minimum number of hops of network bottleneck hop speed
4 that could be in the actual network; and

5 responsive to said network hop count, determining the
6 minimum network discrete utilization.

1 7. The method of claim 6, further comprising the steps of:

2 responsive to said test packets, determining as a
3 maximum network discrete utilization the number of

4 messages queued per network hop count; and

5 responsive to said minimum network discrete utilization

6 and said maximum network discrete utilization,

7 determining a best approximation of end to end discrete

8 utilization.

1 8. The method of claim 7, further comprising the step of:

2 adjusting said end to end discrete utilization for

3 dropped test packets.

1 9. The method of claim 7, said best approximation of end

2 to end discrete utilization being the average of said

3 minimum network discrete utilization and said maximum

4 network discrete utilization.

1 10. The method of claim 7, further comprising the step of:

2 adjusting said best approximation of end to end

3 discrete utilization by selectively weighting said

4 minimum network discrete utilization or said maximum
5 network discrete utilization responsive to network
6 streaming utilization.

1 11. A method for evaluating network characteristics,
2 comprising the steps of

3 determining network utilization;

4 determining average message service time; and

5 calculating the standard deviation of network queue
6 wait time (σTw) = square root of (utilization * (2-
7 utilization)) * (average message service time / (1 -
8 utilization)).

1 12. The method of claim 11, further comprising the step of
2 determining $Tw = \text{utilization} * \text{average message service}$
3 time / (1 - utilization).

1 13. A method for evaluating the discrete utilization of a
2 network, comprising the steps of

3 transmitting through said network and time stamping
4 probative samples; and

5 responsive to said samples, calculating the average
6 wait time and the standard deviation of average delay
7 of said network.

1 14. The method of claim 13, said samples comprising one way
2 echo packets.

1 15. The method of claim 13, said samples comprising two way
2 echo packets.

1 16. The method of claim 13 for deriving the discrete
2 utilization of a network, further comprising the steps of:

3 deriving said discrete utilization as the ratio of the
4 wait time of said network to the standard deviation of

5 the average queue wait time.

1 17. The method of claim 16, further comprising the
2 steps of:

3 fine tuning said discrete utilization by averaging
4 dropped instances of said samples with successful
5 transmissions of said samples to derive a measure of
6 discrete utilization based upon a total set of said
7 probative samples.

1 18. System for evaluating a network, comprising:

2 an apparent network speed analysis application for
3 measuring average message delay through said network;
4 determining the standard deviation of said message
5 delay; and

6 calculating the discrete utilization of said network as
7 the ratio of said average message delay to said
8 standard deviation; and

9 a service level and capacity planning routine for
10 tuning said network.

1 19. The system of claim 18, said service level and capacity
2 planning routine further for calculating change in network
3 traffic before network response time service level is
4 compromised; determining additional file load capacity of
5 the network; and adjusting window size for file transfer to
6 fill remaining capacity.

1 20. System for evaluating a network, comprising:

2 a first program module for measuring average message
3 delay through said network;

4 a second program module for determining the standard
5 deviation of said message delay; and

6 a third program module for calculating the discrete
7 utilization of said network as the ratio of said
8 average message delay to said standard deviation.

1 21. A program storage device readable by a machine,
2 tangibly embodying a program of instructions executable by a
3 machine to perform method steps for evaluating a network,
4 said method steps comprising:

5 measuring average message delay through said network;

6 determining the standard deviation of said message
7 delay; and

8 calculating the discrete utilization of said network as
9 the ratio of said average message delay to said
10 standard deviation.

1 22. A computer program product or computer program element
2 for performing the steps of:

3 measuring average message delay through said network;

4 determining the standard deviation of said message
5 delay; and

6 calculating the discrete utilization of said network as

